zoospores in motion have a power of contracting and expanding very quickly, and of very considerably changing their form; this changing of form, he considers, constitutes in itself the mechanism of motion. In this essay he has clearly proved that in the algæ then under examination, the cilia cannot be the true organs of motion.

The zoospores originate always in the cells that lie on or near the margin of the frond; they afterwards appear in abundance in the upper parts of the frond, whence they spread gradually downwards, till they fill up all the cells of the monostromatic part.

When the motion finally ceases, the zoospores fasten themselves to some object near at hand, and then begin to develop into young plants. The zoospores which, till this time, were formed of the bare protoplasm only, are now covered with a cellular membrane. The cilia disappear, and a process of division commences, which, however, in the species of this genus, has not been studied. In several other well-known Ulvæ, this division takes place first in one dimension, but afterwards in two; thus an expanded membrane is formed. This increase in size takes place, according to the observations of authors, principally, but not exclusively, in the periphery of the frond, or on the apex, if there be one. The youngest parts of the plants are thus always at the top, and the oldest at the base. In this way the frond acquires a tolerable leaf-like aspect.

As before-mentioned, the frond does not in all the species remain attached during its whole life to some object. It is often found, fresh and in full vigour, lying loosely at the bottom of the water in which it grew. Thus, according to the experience of authors, these free examples are entirely monostromatic. Hence there is reason for the opinion that, in this case, the frond divides itself into two parts, and that the division-line between them falls just on the border between the upper monostromatic part of the frond and the lower, and not monostromatic. The upper part of the frond survives for a considerable time, and generally increases in size, until the formation of zoospores begins, when it gradually decays. The fate of the other part of the frond is involved in obscurity. Dr. Wittrock thinks it not improbable that the cells may detach themselves from each other, and become a kind of fixed gonidia, which finally develop into young plants. Such a mode of increasing would agree with that which, according to Kützing, occurs in several species of the genus Ulva of authors (*Phycoseris*, Ktz.), where the cells in the stipes of the plants, after the frond becomes free, put forth budding-cells. It also occurs in Prasiola.

Kützing, in his works, speaks of another kind of reproductive bodies, the so-called *Spermatia*, which he says occur in the Ulvaceæ. He describes them as brown, and as detached from the surface of the frond, also as round bodies with a thick hyaline membrane, the contents of which are brown and granular. In *Ulva latissima*, Ktz., to judge from the figure, they appear to be about three times as long as the outer cells. Dr. Wittrock had been unable, after diligent search, to find them. To Thuret their use was unknown, and Jessen supposed that they proceeded from some accidental deformity of the common cellular tissue.

No genus in the whole vegetable kingdom has so wide a range as Monostroma. It has representatives in all parts of the world, but the greater part of the species prevail in the colder parts of the European temperate zone. Of the eighteen species which are known with tolerable certainty to belong to the genus twelve are found in this zone. In the southern part of the Polar regions the genus has not less than seven representatives; in the equatorial zone one species is found; south of the range of the "wild goat," only two. In Europe there are fifteen species; in Asia, two (or, including *M. fuscum*, three); in Africa, one; in North America, one; in South America, one; and in Australia, three species.[1]

Many of the species grow in salt water, some prefer brackish, others inhabit fresh water. They grow generally in shallow water, most frequently only one or two feet below the surface; but two species often grow many fathoms under water. Some species are found at nearly all times of the year, others in the spring and summer only. All are annuals.

To facilitate examination and to preserve as much as possible the natural order, Dr. Wittrock has subjoined a tabular view of the species which he has examined. The characters are here adduced partly from the form and position of the cells as shown in a transverse section of the frond, partly from the development of the chlorophyll bodies and the thickness of the frond. The arrangement of the species in this scheme is not altogether the same as that afterwards observed in the treatise.

The species are fully, even minutely described, and the monograph is illustrated by four plates, in which magnified figures are given of the surface and transverse sections of the fronds. These are extremely useful, since the species can be determined by microscopic observation only.

MARY P. MERRIFIELD

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[1] At present three species only of Monostroma are known to grow on the British shores, namely, *M. bullosum*, *M. Grevillei*, and *M. latissimum*. The first inhabits fresh water, the others salt water. On the north coast of France five species are found.—M. P. M.

SCIENTIFIC SERIALS

IN the most recent numbers of the *Journal of Botany* (May–July), the most interesting article is perhaps the description of a new British Umbellifer, *Selinum Carvifolia*, by Mr. F. A. Lees, illustrated by a plate. The plant is widely distributed on the Continent, and has been now discovered in Lincolnshire by the Rev. William Fowler. It has apparently been confounded with *Peucedanum palustre*, to which however it is not very nearly allied, and should be looked for elsewhere.

THE recent numbers of the *Scottish Naturalist* (October 1881–July 1882) contain the usual supply of articles on various branches of natural history, especially interesting to dwellers in or visitors to the northern parts of our island.

The American Journal of Science, June.—Respiration of plants, by W. P. Wilson.—On the question of electrification by evaporation, by S. H. Freeman.—Observations on snow and ice under pressure at temperatures below 32° F., by E. Hungerford.—On the minerals, mainly zeolites, occurring in the basalt of Table Mountain, near Golden, Colorado, by W. Cross and W. F. Hillebrand.—On a new locality for Hayesine, by N. H. Darton.—Notes on the electromagnetic theory of light, II., by J. W. Gibbs.—New phyllopod crustaceans from the Devonian of New York, by J. M. Clarke.—An organ-pipe sonometer, by W. Le Conte Stevens.

THE *Journal of the Franklin Institute*, July.—Description of the Edison steam dynamo, by T. A. Edison and C. T. Porter.—On the efficiency of the steam boiler, and on the conditions of maximum economy, by R. H. Thurston.—Note on the economy of the windmill as a prime mover, by A. R. Wolff.—Harmonic intonation of Chime bells (continued), by J. W. Nystrom.—An organ-pipe sonometer, by W. Le Conte Stevens.—Analysis of Helvite from Virginia, by R. Haines.—The absorption of metallic oxides by plants, by F. C. Phillips.—Applications of the principle of the phonodynamograph, by W. P. Cooper.—Remarks made at the closing exercises of the drawing school, May 18, 1882, by C. Sellers, jun.—Conservation of solar energy, by P. E. Chase.

THE *Bulletin of the Torrey Botanical Club* for April contains an interesting article by Mr. T. F. Allen on the "Development of the Cortex in *Chara*," illustrated by 8 plates. The author divides the species belonging to the genus into eight groups, characterised by the mode of development of the cortical cells and cortical tubes. Three new species are described.

Annalen der Physik und Chemie, No. 6.—On the electricity of flame, by J. Elster and H. Geitel.—On double refraction in glass and sulphide of carbon produced by electric induction, by H. Brongersma.—On measurement of small electric resistances, by C. Dieterici.—Note on weakly magnetic and dia-magnetic substances, by P. Silow.—Some experiments on diffusion of gases through hydrophane of Czernowitza, by G. Hüfner.—General formulæ for determination of the constants of elasticity of crystals by observation of the flexure and drilling of prisms, by W. Voigt.—On the molecular attraction of liquids for each other, by P. Volkmann.—Reply to the memoir of Herr V. v. Lang: "Determination of the quotients of refraction of a concentrated solution of cyanin," by C. Pulfrich.—Experiments on colour-mixtures, by R. Schelske.—A proof of Talbot's proposition, and remarks on some of its consequences, by F. Boas.—On the replacement of a centred system of refracting spherical surfaces by a single one of this kind, by F. Kessler.—On singing condensers, by W. Holtz.—On coloured sparks and their production by internal and external resistances, by the same.—Remarks on the production of Lichtenburg figures, by K. L. Bauer.

No. 7.—On transpiration of vapours (III. Memoir), by V. Steudel.—On the same, (IV. Memoir), by L. Meyer.—General formulæ, &c. (continued), by W. Voigt.—Volume and angular

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changes of crystalline bodies with omni- or uni-lateral pressure, by the same.—On the absorption of heat by gases and a method based thereupon for determination of the amount of carbonic acid of atmospheric air, by H. Heine.—On the absolute system of measurement, by P. Volkmann.—Deduction of the fundamental law of crystallography from the theory of crystalline structure, by L. Sohncke.—On the molecular-kinetic laws of heat of vaporisation and the specific heat of bodies in various forms of aggregation, by A. Walter.—On the different systems of measures for measurement of electric and magnetic quantities, by R. Clausius.—On the metallic galvanic battery of Perry and Ayrton, by B. J. Goosens.—The Waltenhofen phenomenon and the demagnetisation of iron bodies, by F. Auerbach.—On the behaviour of electricity in gases, by F. Narr.

Reale Istituto Lombardo di Scienze e Lettere, Rendiconti, vol. xv. fasc. xi.—On some formulæ relative to calculation of errors of observation, by S. A. Maggi.—On two fossiliferous planes of the Lias in Umbria, by C. F. Parona.—On the variability of *Cobitis tænia*, by E. Cantoni.—On caffeic acid obtained from *Cinchona cuprea*, by G. B. Körner.—On an herbarium about 3000 years old, by G. Cornalia.

SOCIETIES AND ACADEMIES

LONDON

Anthropological Institute, June 27.—General Pitt-Rivers, F.R.S., president, in the chair.—Mr. Villiers Stuart, M.P., exhibited and described a drawing of the funeral canopy or tent of an Egyptian queen, and some casts of bas-reliefs discovered by him within a short distance of the tent.—Mr. E. H. Man read a further account of the natives of the Andaman Islands, in which he treated more particularly of their home life; the food and methods of cooking were fully described; also the games, amusements, and dances.—A communication was received from Mr. H. C. R. Becher on some Mexican terra-cotta figures found near the ancient pyramids of San Juan Teotihuacan; from a comparison of these figures with those in the museum at Palermo the author argued that they were produced by people of the same race, and that the builders of these ancient monuments were Phœnicians.

Royal Horticultural Society, June 27.—Sir J. D. Hooker in the chair.—*Hollyhock attacked by Fungi:* Mr. W. G. Smith exhibited fruits, and an enlarged drawing, showing them to be often badly attacked by *Puccinia malvacearum*, and a *Cladosporium*, which would probably account for the presence of the Uredo noticed by Mr. Berkeley in the germinating plants.—*Hybrid Lily:* Mr. G. F. Wilson exhibited a very remarkable hybrid between *L. Washingtonianum* and *L. superbum*, which had the foliage of the former, but flowers more like those of the latter.—*Synanthic campanulas:* Mr. G. S. Boulger mentioned that Mr. Gibbs, of Chelmsford, had fertilised a common form of Campanula (with catacorolla), with the pollen of a synanthic blossom. He had raised 200 plants, and many had synanthic flowers.—*Retinospora sport:* Dr. M. T. Masters exhibited a specimen of *R. squarrosa*, which had borne a branch with the characters of *R. pisifera*, proving these supposed species to be one.—*Monstrous Flowers:* Dr. Masters exhibited virescent flowers of Auricula; Mr. Laing, a rose-pink double Begonia, with axillary prolifications of double flowers besides a terminal one, all proceeding from the centre of a male flower; the female flowers being compact and double, but not proliferous to the same extent.—The Rev. G. Henslow exhibited a branch of wallflower covered with minute and almost capillary leaves.

July 11.—Dr. M. T. Masters in the chair.—*Hollyhock disease:* Mr. W. G. Smith exhibited fruits of *Malva sylvestris* with *Puccinia malvacearum*. They confirmed the correctness of his view that the fruits infected by this fungus fall to the ground, and are then capable of producing seedlings diseased with *Uredo* without the intervening *æcidium* stage, as in the case of the hollyhock mentioned above.—*Scolopendrium, diseased:* he also showed the harts-tongue fern attacked by *Didymium effusum*, Lk., a myxomycetous fungus, new to Great Britain. It occurs on both sides of the frond, and grows over the ruptured masses of spore-cases, and even amongst the free spores (for description and figures see *Gardeners' Chronicle*, July 15, 1882).—*Clematis and oat* roots attacked by vibrio (*Tylenchus*, sp. ?): Dr. Masters showed specimens and observed that it was only one variety of black oat which was attacked, but that to such an extent as to destroy whole crops.—*Gardenia and Petroleum:* he brought a spray to show its healthiness after being treated by syringing with this oil and water (a wine-glass to a gallon), to destroy mealy bug.—*Water-lily with foliaceous sepal:* he also exhibited a specimen in which one sepal had developed a leaf-blade at its apex, proving that (as is usually the case) a sepal is homologous with the basal part of the petiole only.—*Coloured pea-pods:* Mr. Laxton of Bedford sent green, purple, and speckled pods, the latter a result from crossing the two former. The purple colour appears to overlie the chlorophyll, which it thereby conceals.—*Antirrhinum Hendersoni:* Mr. Cannell forwarded sprays of this race, which has white flowers with crimson border, but which will not set seed, this being apparently due to atrophy of the pollen. The anthers had dehisced even in bud, and such few pollen-grains as were present were minute and abortive. The ovules, however, appeared to be normal; yet the race does not seem capable of being crossed. Mr. Henslow remarked that when white and purple snapdragons werh crossed the result is usually a streaked corolla with no certainty in the markings as in the present case.—*Aerial petato-tubers:* the Rev. G. Henslow exhibited tubers found in the axils of leaves. He also showed plum leaves perforated with small circular holes, caused by raindrops concentrating the sun's rays, which had thus burnt them.

EDINBURGH

Royal Society, July 3.—Prof. Maclagan, in the chair.—Prof. Tait, in a note on the kinetic theory in relation to dissociation, stated that it followed from that theory as ordinarily enunciated that dissociation should take place at all temperatures, though of course very slowly at low temperatures. This, according to the chemists, was irreconcileable with the facts. It appeared, then, that a slight modification of the kinetic theory is necessary, so as to restrict the utmost ratio in which the velocity of an individual particle may exceed the velocity of mean square. This would entirely remove the difficulty, while in no way interfering with the success of the theory in other directions. A strong analogy in favour of this is afforded by the equation of diffusion and of conduction, from which an infinite velocity is assigned under certain cases to a particle of salt in water. This arises at once from the assumption that the diffusion is always directly proportional to the gradient of strength, however small that gradient may be.—Dr. Knott communicated a brief paper by Mr. Albert Campbell on experiments on the Peltier effect, in which the author had obtained by a very simple method the ratio of the Peltier effect for a given pair of metals at 20° C. to that at 100° C. The pairs he experimented on were iron-lead, iron-zinc, iron-german silver, and lead-silver; and the ratios obtained for these differed in no case more than 8 per cent. from the values indicated on Prof. Tait's thermo-electric diagram—a remarkably close agreement, considering how much metals of the same name differ in their thermo-electric properties.—Prof. Marshall read the continuation of the paper by himself, Prof. C. Michie Smith, and Mr. R. T. Omond, on the lowering of the maximum density point of water by pressure. They had repeated their former experiments with fresh water, and had investigated similarly salt water of about the same density as sea-water. Salt water apparently had no maximum density point at ordinary pressure—a fact previously known—or rather the maximum density point as calculated from a modification of Thomson's formula expressing the thermal effect due to any sudden compression in terms of that compression, is, so to speak imaginary, lying below the freezing-point. The results with salt water are important, as giving greater confidence in their method, so that the lowering of the density-point of fresh water by 5° C., by a pressure of one ton weight on the square inch may be accepted as not far from the truth.—The Rev. J. L. Blake read a paper on vocalisation and articulation, which was a continuation of his former paper on breath-pressure, and in which he considered specially the actions of the various muscles on the lungs and vocal organs in producing speech, pointing out what he considered the chief differences in the actions which accompany breathing, speaking, and singing.

BERLIN

Physiological Society, June 2.—In our account of this meeting (NATURE, vol. xxvi. p. 216), by an oversight a page of the report was omitted. At the close of the notice of Prof. Kronecker's report on Dr. Melzer's experiments on the action of the vagus, and before the words "Since Hunter's time," the following paragraph should have been inserted:—"Prof. du Bois-Reymond read a second report on the recently instituted researches of Prof. Fritsch in Egypt and the Mediterranean, on electric fishes. After Fritsch had satisfied himself

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